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Bacteriophage Applications— Historical Perspective and Future Potential



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Chapter 1

Overview of Bacteriophage Lifecycles and Applications

1 Introduction

Bacteriophages (phages) are well-established bacteria-specific viruses whose discovery is credited to the independent and nearly simultaneous works of Twort (1915) and d'Hérelle (1917) (Summers 1999) in the early 20th century. Each of the researchers characterized phages as the pathogens of bacteria following the hint of much phage-like phenomena from the 19th and 20th centuries. The late 1930s and early 1940s represented the most significant era for phage research and its impact on biological research (Abedon and Thomas-Abedon 2010), including the research by the “Phage Group”. This group included the work of Max Delbrück and other highly notable geneticists, including James Watson and Francis Crick (Abedon 2012a). The group quickly established that phage could be used for the treatment of bacterial infections, since called “phage therapy”, and were so named. “Bacteriophage” translates to “bacteria eaters”.

While phage biology and the study of phage genetics were of interest, it was phage therapy that and its antibacterial potential that was the primary driver for phage research (Hanlon 2007; Summers 2001). Phage therapy however, failed to match the anticipation of its initially envisioned potential, particularly in a time when the phage themselves were poorly characterized, and the approach was thwarted in favour of small molecules in the Western World in the 1950s (Kropinski 2006; Summers 2001).

Although phage-based therapeutics did not meet the expectations of their initial interest, they have played a crucial role in the study of genetics and molecular biology (Henry and Debarbieux 2012), including contributions to the understanding of organisms much more complex than the phage themselves (Campbell 2003; Goodridge 2010). As such, the study of phage may have actually set the stage for its own demise in medicine.